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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,263	09/25/2003	Yong Wang	12859B-DIV	3226
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FRANK ROSENBERG			EXAMINER	
P.O. BOX 29230			HANDAL, KAITI V	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/669,263	Applicant(s) WANG ET AL.	
	Examiner Kaity Handal	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 22-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 22-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/22/2007 has been entered.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-5 and 23-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepp et al. (USP 3,461,183) in view of Schuh et al. (WO 99/15715).

Regarding claims 1 and 5, Hepp et al. discloses a catalyst comprising: a zirconia-supported, alkali metal modified ruthenium catalyst (C2/L1-35).

Additionally, while Hepp et al. does not explicitly disclose said catalyst being disposed over a porous substrate, the reference discloses that said catalyst is in the form of spheres (C7/L1-75). Desired properties of the catalyst of Hepp et al. are longer life on stream and high activity (C1/L10-75, C2/L35-41, C3/L10-30). Further, Hepp et al. discloses that it is desired to use said catalyst in processes producing compressed

product (C1/L35-54), therefore, said processes should operate with low pressure drop.

Schuh et al. teaches an improved catalyst comprising, among others, a zirconia-supported ruthenium catalyst (P8/L11-27). The improvement constitutes disposing said catalyst over a porous substrate having an average pore size from 1 μm to 1000 μm (Abstract; P19/L9-25). The benefits of using said improved catalyst are, among others, higher activity, enhanced catalyst life and low pressure drop (P14/L4-10).

It would have been obvious to one having ordinary skill in the art at the time of the invention to dispose the catalyst of Hepp et al. over the porous substrate of Schuh et al. for the purpose of improving catalyst activity, enhancing catalyst life and operating at low pressure drop.

Regarding claim 2, Hepp et al. in view of Schuh et al. disclose all of the claim limitations as set forth above. Additionally, as claim 2 is a product-by-process claim, patentability of said claim is based on the recited product and does not depend on its method of production. Since the product in claim 2 is the same as product disclosed by Hepp et al. in view of Schuh et al. the claim would be unpatentable even if the product of Hepp et al. in view of Schuh et al. was made by a different process. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). See MPEP 2113. This being said, the examiner notes that Hepp et al. does, in fact, disclose the catalyst made by steps comprising: impregnating porous support with solution containing Ru and K, calcining and reducing (C3/L68-C8/L25), wherein said porous support comprises zirconia (C2/L1-35).

Regarding claims 3 and 23-24 Hepp et al. in view of Schuh et al. disclose all of

the claim limitations as set forth above. Additionally Hepp et al. discloses the catalyst comprising:

- 0.1 to 10 wt% Ru and 0.1 to 10 wt% K (C2/L1-35 and C3/L68-C8/L25);
- 0.2 to 3 wt% Ru and 0.1 to 10 wt% K (C2/L1-35 and C3/L68-C8/L25).
- 0.5 to 3 wt% K (C2/L1-35 and C3/L68-C8/L25).

Regarding claims 4 and 27-29, Hepp et al. in view of Schuh et al. disclose all of the claim limitations as set forth above. Additionally while Hepp et al. in view of Schuh et al. do not explicitly disclose any specific pore size distribution of the catalyst, Schuh et al. does disclose that the penetration of the coating into the interior of the porous substrate and the coating thickness are variables that can be controlled, among others, by varying the pore size of the porous substrate (P6/L19-P7/L8). Therefore the specific pore size distribution of the catalyst can not be considered to confer patentability to the claims because the precise pore size distribution of the catalyst would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed pore size distribution of the catalyst cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the pore size distribution of the catalyst of Hepp et al. in view of Schuh et al. to obtain the desired penetration of the coating into the interior of the porous substrate and the desired coating thickness (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges

involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Regarding claim 25, Hepp et al. discloses a catalyst comprising: a zirconia-supported, alkali metal modified ruthenium catalyst (C2/L1-35) comprising 0.2 to 3 wt% Ru and 0.1 to 10 wt% K (C2/L1-35 and C3/L68-C8/L25).

Additionally, while Hepp et al. does not explicitly disclose said catalyst being disposed over a porous substrate, the reference discloses that said catalyst is in the form of spheres (C7/L1-75). Desired properties of the catalyst of Hepp et al. are longer life on stream and high activity (C1/L10-75, C2/L35-41, C3/L10-30). Further, Hepp et al. discloses that it is desired to use said catalyst in processes producing compressed product (C1/L35-54), therefore, said processes should operate with low pressure drop.

Schuh et al. teaches an improved catalyst comprising, among others, a zirconia-supported ruthenium catalyst (P8/L11-27). The improvement constitutes disposing said catalyst over a porous substrate having an average pore size from 1 μm to 1000 μm (Abstract; P19/L9-25). The benefits of using said improved catalyst are, among others, higher activity, enhanced catalyst life and low pressure drop (P14/L4-10).

It would have been obvious to one having ordinary skill in the art at the time of the invention to dispose the catalyst of Hepp et al. over the porous substrate of Schuh et al. for the purpose of improving catalyst activity, enhancing catalyst life and operating at low pressure drop.

Additionally Hepp et al. discloses the catalyst comprising porous support with a surface area greater than 10 m^2/g (C7/L19-75). Further, Hepp et al. discloses the catalyst wherein said porous support comprises zirconia (C2/L1-35). In view of said

disclosure, it would have been obvious to one having ordinary skill in the art at the time of the invention to replace said porous support with a surface area greater than $10 \text{ m}^2/\text{g}$ (Hepp et al., C7/L19-75) with zirconia having a surface area greater than $10 \text{ m}^2/\text{g}$ to obtain catalyst with similar catalyst activity.

Further, regarding claim 25, the examiner notes that recited BET surface area of ZrO_2 is not considered to confer patentability to the claims. As the catalyst activity is a variable that can be modified, among others, by adjusting BET surface area of ZrO_2 (catalyst support), the precise BET surface area of ZrO_2 would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed BET surface area of ZrO_2 cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the BET surface area of ZrO_2 in the catalyst of Hepp et al. in view of Schuh et al. to obtain the desired catalyst activity (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Regarding claims 1, 5, 25, 30-31 and 33-34, Hepp et al. in view of Schuh et al. disclose all of the claim limitations as set forth above. Additionally, regarding limitations recited in said claims, which are directed to specific properties of the catalyst and its performance, the examiner notes that once a specific catalyst composition is disclosed by the references, as set forth above, the disclosed catalyst will, inherently, display

recited properties.

Regarding claims 26 and 32, Hepp et al. in view of Schuh et al. disclose all of the claim limitations as set forth above. Additionally, Schuh et al. discloses the catalyst having:

- a pore volume of 30 to 95% (P19/L7-25);
- wherein the porous substrate comprises a felt (P19/L7-25).

3. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hepp et al. (USP 3,461,183) in view of Schuh et al. (WO 99/15715), as applied to claim 1 above, and further in view of Hiramatsu et al. (EP 480,461).

Regarding claim 22 Hepp et al. in view of Schuh et al. disclose all of the claim limitations as set forth above. Additionally Schuh et al. discloses the catalyst wherein the porous substrate comprises Fe-Cr-Al alloys (P5/L10-21), but the reference does not explicitly disclose said substrate further comprising Y.

It was known in the art at the time of the invention that stainless steels comprising a FeCrAl and Y can be effectively used as catalyst supports, and further it was known in the art at the time of the invention that the manufacturing cost and final properties of the finished catalyst are variables that can be modified, among others, by varying the composition of said stainless steel substrate (e.g. Hiramatsu et al. see P2/L6-52). In view of this knowledge, specific composition of the stainless steel support can not be considered to confer patentability to the claims because it would have been considered a result effective variable by one having ordinary skill in the art at the time

the invention was made. As such, without showing unexpected results, the specific support composition cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the specific composition of the stainless steel support of Schuh et al. to obtain the desired catalyst properties (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Further, Hiramatsu et al. teaches that stainless steels comprising a FeCrAl and Y can be effectively used as catalyst supports (P2/L6-52). Therefore, use of said stainless steel comprising FeCrAl and Y as a support for the catalyst of Hepp et al. in view of Schuh et al. would be obvious to one of ordinary skill in the art, because it would amount to nothing more than a use of a known material for its intended use in a known environment to accomplish entirely expected result.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

5. Applicant's arguments filed 22 October 2007 have been fully considered but they are not persuasive.

6. The declaration submitted by Jianli Hu is a mere opinion on what can be expected (versus what is, or known to be expected) in terms of catalyst properties when using different making methods thereof. The declaration does not compare the closest prior art to the instant claims.

7. The declaration submitted by Richard Long is a mere opinion, the experts thinks that it was not known in 2001 that a high surface area catalyst would be undesirable in the process of Hepp et al. The declaration does not compare the closest prior art to the instant claims.

8. In response to applicant's argument that there is no suggestion to combine the references, Hepp et al. in view of Schuh et al., the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine is found in the references themselves. As set forth above, desired properties of the catalyst of Hepp et al. are longer life on stream and high activity (C1/L10-75, C2/L35-41, C3/L10-30). Further,

Hepp et al. discloses that it is desired to use said catalyst in processes producing compressed product (C1/L35-54), therefore, said processes should operate with low pressure drop. Examiner notes that, since the desired result of the process of Hepp et al. is a compressed product, clearly, operation with low pressure drop would bring the process closer to the desired end result, possibly eliminating necessity of an additional compression step. It is not clear to examiner why operation at high pressure excludes the need for operation with low pressure drop, especially since the high pressure of product is desired. Schuh et al. teaches an improved catalyst comprising, among others, a zirconia-supported ruthenium catalyst (P8/L11-27). The improvement constitutes disposing said catalyst over a porous substrate having an average pore size from 1 μm to 1000 μm (Abstract; P19/L9-25). The benefits of using said improved catalyst are, among others, higher activity, enhanced catalyst life and low pressure drop (P14/L4-10). Since the desired properties of the catalyst of Hepp et al. are longer life on stream and high activity and allowing operation with low pressure drop it would have been obvious to one having ordinary skill in the art at the time of the invention to dispose said catalyst over a porous substrate as Schuh et al. teaches doing so provides higher activity, enhanced catalyst life and low pressure drop.

9. The applicant argues that the catalyst recited in rejected claims is nonobvious over the prior art because it shows superior and unexpected results, as shown by examples. This is not found persuasive. Applicant alleges unexpected results based on evidence presented in specification, (Examples). The question as to whether unexpected advantage has been demonstrated is a factual question. *In re Johnson*,

747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984). Thus, it is incumbent upon applicant to supply the factual basis to rebut the prima facie case of obviousness established by examiner. See, e.g., *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972). Applicants, however, do not provide an adequate explanation regarding any factual showing in the specification of unexpected results as the comparison samples in said examples do not fairly represent the closest prior art. In fact modified catalyst of Hepp et al. appears to be the same as the catalyst in the examples which shows the superior and unexpected results. Therefore, given the prior art teachings, the applicants have not met the burden of establishing that the reported results would have been truly unexpected to a person of ordinary skill in the art on this record or otherwise established the unobviousness of the claimed composition. *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972).

10. It would have been prima facie obvious within the purview of 35 USC § 103 to replace porous support comprising zirconia in catalyst of Hepp et al. (C2/L1-35) with a porous support having a surface area greater than 10 m²/g (C7/L19-75) to obtain catalyst with similar catalyst activity. See *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). Applicant's argument that high surface area catalyst would be undesirable in the process of Hepp et al. is unpersuasive since no factual or testimonial evidence has been presented.

11. Applicants arguments that catalyst of Hepp et al. would not display activities recited in claim 5, 30, 31, 33, and 34 is unpersuasive since no factual or testimonial evidence has been presented. It is not clear how discussion of CO Hydrogenation of

Co/SiO₂ Catalyst commensurate in scope with either claimed and prior art catalyst comprising a zirconia-supported, alkali metal modified ruthenium.

12. Applicant argues on page 9 of the Remarks that:

“There is no suggestion to improve Hepps' catalyst for better water-gas shift catalyst activity. The catalyst of Hepp et al. was designed for alkane dehydrogenation. Therefore, it would not have been obvious to modify Hepp' s catalyst to obtain better water-gas shift catalyst activity.”

Examiner respectfully disagrees. Schuh et al. teaches an improved catalyst comprising, among others, a zirconia-supported ruthenium catalyst (P8/L11-27). The improvement constitutes disposing said catalyst over a porous substrate having an average pore size from 1 μm to 1000 μm (Abstract; P19/L9-25). The benefits of using said improved catalyst are, among others, higher activity, enhanced catalyst life and low pressure drop (P14/L4-10). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to dispose the catalyst of Hepp et al. over the porous substrate of Schuh et al. for the purpose of improving catalyst activity, enhancing catalyst life and operating at low pressure drop.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


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KH: 

12/13/2007


ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER